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The Classical Weekly

Entered as second-class matter November 18, 1907, at the Post Office, New York, N. Y., under the Act of Congress of March 1, 1879
Acceptance for mailing at special rate of postage provided for in Section 1103, Act of October 3, 1917, authorized on June 28, 1918

VOL. XIII

NEW YORK, OCTOBER 13, 1919

No. 2

ANALYSIS OF LUCRETIUS, DE RERUM NATURA I-III

(Continued from page 5)

Part Two <of Analysis, II, A, 9> (705-829):

- (a) Preliminary statement: For these reasons, equally absurd is the view that the universe is developed out of any other single basic thing (air, or water, or earth), or out of any two of these things, or even out of all four of them together (705-715), even though this view is held by Empedocles, fairest product of fair Sicily (716-741).
- (b) Proofs (742-829):
 - (1) Such teachers deny the existence of void, and yet maintain that there is motion in the universe, and that there are soft and rarified bodies in the universe (742-745).
 - (2) They set no limits to the divisibility of things (746-747), and admit no 'least' (748). The latter view is contrary to the evidence of our senses (749-750) and to the inference we draw by analogy from that evidence (751-752).
 - (3) Their view makes the *primordia* soft. Since soft things are born and die, from their view two inferences follow, (1) that the universe would be reduced to nothing, (2) that, if renewed, it would be renewed out of nothing. Both inferences are contrary to our first two basic principles (753-758).
 - (4) The first elements they postulate are hostile one to another: hence, if they come together, they will slay one another utterly or at the least they will recoil one from another (759-762)²³.
 - (5) Can these four things really be called the sources of the others? or are all other things rather the sources of these four, in view of the way they are begotten by turns and interchange natures? (763-769).
 - (6) If, when the elements combine, each of them keeps its individuality, then no creation at all will be possible, since, however they are combined, earth will still be earth, fire fire, etc. Things of which that can be true cannot be *primordia* (770-781).
 - (7) The attempt to explain the growth of the universe on the basis of the flux of the four elements, by saying that fire changes into air,

and air into water, and water into earth, and that earth passes back into water, water to air, air to heat, is not successful (782-788). First principles should be immutable: else all things will be reduced to nothing (789-797). This view, then, makes the existence of the world unexplainable. A sounder view is to predicate the existence of atoms which can produce fire, and then, by a process of addition or subtraction, or shift of order or motion, produce air or anything else (798-802).

- (8) If the retort is made that in the phenomena of growth of fruits, trees, and animals, these four elements have a part, I answer, Certainly; we mortals too are nurtured by dry food and by moisture (803-813). But this proves not *your* view, but rather *mine*—that there are many kinds of *primordia*, common to many objects: only in this way can the variety we see in the universe be explained (814-816). Out of these many kinds of *primordia*, through their combinations in different things, their different arrangements and movements, are the widely diverse things in the universe produced, even as out of common letters words and verses widely diverse in sense and sound are produced (817-829).

Part Three <of Analysis II, A, 9> Examination of Anaxagoras's doctrine of homoeomeria (830-920).

- (a) Announcement of theme (830-833), and definition of homoeomeria (834-842).
- (b) Declaration that Anaxagoras is wrong, because
 - (1) he denies the existence of void (843);
 - (2) he sets no limit to divisibility (844-846);
 - (3) he makes his *primordia* weak and perishable (if we allow that his supposed *primordia* are *primordia* at all), for in every case his *primordia* are identical in character with the objects produced from them, and so perishable even as those objects are perishable (847-856). But such a view is inconsistent with our first two basic principles (857-858).
- (4) On Anaxagoras's theory, since food, dry and wet, nurtures our bodies, and develops our veins, blood, bones, and sinews, either our body contains particles of the same kind as the foods, which are not of the same kind as the body itself, or else the food contains particles of the same kind as the body, which are not of the same kind as the food itself (859-866).

²³The result would be that no combinations—objects—could be formed, and so there would be no world at all.

If either part of this dilemma can be established, Anaxagoras's homoeomeria is, of course, at once disposed of, because we shall have bodies containing, in part at least, alien elements.

- (5) The phenomena of plant life militate against Anaxagoras's theory. If every thing that grows out of the earth is in the earth, then the earth contains alien elements (867-869). The analogy will hold good of other things—e. g. of logs (870-874).
- (6) Anaxagoras's effort to save himself by arguing that, though all things are in all things, only one thing after all makes its presence felt and seen in a given object, i. e. only that one thing which is most largely present in the object and stationed in the forefront of it, does not help him (875-880); for on this theory, grain, the eating of which nurtures our bodies, should, when broken, show drops of blood, etc. (881-883), grasses ought to show milk (884-887), lumps of sod, when broken, ought to show grasses, fruits, etc. (888-890), logs, when broken, ought to show ashes and smoke and fire (891-892). They do not (893-894). Hence once more we come to my doctrine of many *primordia* common to many things (895-896).
- (7) If you remind me that often, when tree tops rub together, fire is produced, and then hold that this proves that fire is in trees, and find in this an argument for Anaxagoras's view (897-900), I answer that you are wrong; this phenomenon is explainable rather on my view, that heat and the trees possess many *primordia* in common (901-903). If fire were really in the trees, it could not be concealed; the trees would all be consumed (904-906). No, the truth is as I have so often stated it; there are divers *primordia*, whose varying combinations and arrangements and movements produce varying things, among them fire (908-914).
- (8) If you insist that the *primordia* must be of the same nature as the things made out of them, I answer that on this view the *primordia* cease to be *primordia*—on such a theory the *primordia* of men would be men in miniature, able to laugh and to weep, even as are men themselves (915-920).
10. Matter and space are infinite (921-1113).
 - (a) Preliminary appeal to the reader (921-950).
 Lucretius is sure that his prayer to Venus in 1.1-43 has been answered.
 - (b) Statement of the question next to be considered: Is matter finite or infinite? is space finite or infinite? (951-957).
 - (c) Answer to the question: The universe is infinite (958-959).
 - (d) Proofs:
 - (1) There is no *visible finis* of the universe; hence there is no *finis* of the universe (959-967).

- (2) To imagine a *finis mundi* leads to a *reductio ad absurdum* (968-983). Set yourself at a supposed *finis mundi*, and try to fling a javelin onward (968-970). Either you will find yourself *able* to throw the javelin onward (971-972), or you will find yourself *unable* to throw the javelin onward (973-974). In either case there is something beyond your supposed *finis* (975-983).

I sympathize with Lee's position with respect to *omne quod est spatium* (969). These four words seem to me, as to him, to mean not 'space (void) as a whole' (so e. g. Bailey), but rather 'the universe'. Logically, after 951-957, Lucretius should have sought (1) to prove matter *per se* infinite, (2) to prove void *per se* infinite. This, I think, has not been done in terms, with respect to matter. He seems to have felt that, if he proved space (= the *universe*) illimitable, he of necessity would prove both his theses, (1) that matter is infinite and (2) that void is infinite.

- (3) The fact that motion is still possible proves that space is illimitable. If space were limited, all matter would have sunk to the bottom of that space, and motion would be at an end, but matter is still in motion, yes, even upward (984-997)²⁴.
- (4) There is no visible *finis* to the universe; hence there is no *finis* (998-1001). Here come a restatement and summary: space is infinite (1002-1007). Compare (1), above.

Some transpose these verses to a place after 967. One of the values of this Analysis is its demonstration that such transpositions are needless. The demands of an absolutely and rigidly logical arrangement of all the parts of an argument or exposition are one thing, and deserve careful consideration from every editor; the actual facts of Lucretius's workmanship are, at times, quite at variance with such demands. See Notes 7, 8, 10, 11, 15.

- (5) The fact proved above <511-519, 520-527>, of the alternation of matter and void, itself proves that matter and void are both illimitable, or, putting it differently, we may say that the very constitution of the universe proves that matter and void (= space) are both infinite (1008-1013). <For suppose that space were not bounded unceasingly by matter, i. e. suppose that matter had not been, were not, infinite>: earth and sea and sky would perish (1014-1018), indeed would never have been produced (1019-1020), for it is only because the atoms are so many, because they have been moving about in such varied ways for endless ages under divers assaults and blows that the production of things was possible at all (1021-1028), and things have been kept as they were produced (1029-1034). All these processes require infinite matter (1035-

²⁴The notes on *inferna*, etc., in Lee, Kelsey, and Merrill are curiously misleading; they give too little of what Munro really says. Munro's note should be studied in toto. Here again Lucretius is assuming knowledge on the part of his reader, or else his work here is imperfect, never finished; we might suppose that in various places he deliberately, for the time being, left his treatment imperfect in detail, expecting to live to finish it.

1041), for the clashes of the atoms, which alone make objects possible, would not continue unless the supply of matter were infinite (1042-1051).

- (6) Refutation of the theory that centripetal force—not the very infinity of the universe—holds the universe in being (1052-1118).

(1') Warning to Memmius: There is a theory I would have you reject (1052).

- (2') Statement of the theory (1053-1067):

Everything in the universe is pressing, always, toward the center of the universe, (1053). This is why the universe endures; there is no need, says this theory, to postulate the 'blows' of which I have said so much (1054-1056)²⁵. This theory, say its advocates, explains how persons and objects in the antipodes hold their places, upside down, on the earth (1058-1067).

- (3') Refutation of the theory (1068-1080)²⁵. This theory is absurd, because

(a) There can be no 'center' of an infinite universe (1068-1071).

(β) were there to be such a 'center', things would be as likely to be driven *from* it as to rest there (1071-1073), since void must yield equally everywhere, at center or at non-center, to weighty objects, in whatever direction they are moving (1074-1076), and there is no place in void where objects can come to rest (1077-1080).

- (4') Summary and restatement: the theory is wrong: objects do not press toward the center of the universe, and the world is not held together in any such way (1081-1082).

- (5') Further refutation of the centripetal theory²⁶ (1083-1113).

(a) Those who hold the centripetal theory are inconsistent with themselves, by regarding air and fire and the things that nurture trees, etc., as centrifugal, or at least as ever pressing upwards! (1083-1100).

(β) No, the truth is as I have stated it. Matter (even as space) is infinite: for, if the supply of matter were to fail at any one point, at once that point would be a door of destruction, by which the whole array of matter would be reduced to nothing (1101-1113).

11. Conclusion of Book I (1114-1117): Learn these precepts of mine—an easy task—and one point after another will grow clearer: you will finally see the truth and see it whole.

²⁵1057 is an answer to the theory, injected into the statement of the theory.

²⁶For the form here compare Notes 7, 8, 10, 11, 15

Book II

12. Introduction to Book 2: the charm and the value of philosophy, i. e. of the Epicurean philosophy (1-61).

(a) Fine is it from a place of safety to see from what physical dangers one is himself exempt (1-6); finer far is it from the serene heights whereon <the Epicurean> philosophy dwells to see from what spiritual dangers one is free (7-13).

Briefly put, this means, Blessed indeed is the Epicurean; he alone knows what true happiness is.

(b) Grievous indeed is the darkness, the peril in which ordinary men dwell (14-16). They fail to see how little man's nature really craves—only freedom from pain of body and from pain of mind (17-19). For such freedom in the case of the body little is needed (20-21); here externals count for nothing (22-38); they count for nothing, too, in the case of the soul (39-52). Reason, and reason alone, helps men to win freedom from pain of body and more especially from pain of soul, to gain real light on the problems of the world and of life (53-61).

13. Continuation of the discussion, from the point reached in Book 1: The Motion of the Atoms (62-332).

(a) Statement of the problem to be considered: In what ways do the atoms move in the production and the resolution of objects? (62-66).

Throughout Book 1 the motion of the atoms was taken for granted (compare Note 12).

(b) Reaffirmation of the *fact* that the atoms are in ceaseless motion. Such motion is proved by the phenomena of decay and growth of individual objects: particles are constantly passing from one body to another, making the one grow less, the other greater (67-79).

This argument had been used in another connection: see 1.305-328, and this Analysis II, A, 4, (b), (4), (5), (6).

(c) a 'pivotal' passage <compare Note 7>, serving at once as summary of 62-79, in the form that passage chances to take in 67-79, and as an introduction to further discussion, the discussion promised in 62-66. Motion is essential to existence, is the thought (80-82).

(d) The promised discussion of the question, How do the atoms move? (83-332). For the promise, see above, II, A, 13, (a).

(1) Preliminary statement (83-88): Since it is through void that the atoms are straying, they must move either <downward> by reason of their weight (83-84), or <in what I call the 'swerve'> by reason of 'blows' from other atoms, i. e. as the result of their collisions with other atoms (85-88).

Here Lucretius assumes the 'swerve', which is not, in fact, discussed till 251-293. Compare Note 12.

- (2) The downward motion is ceaseless—from everlasting to everlasting: remember that there is no 'bottom' in the universe (89-96).
- (3) From this downward motion <modified by the swerve> result the collisions and the recoils, some large, some small, of the atoms (97-99).
- (4) When atoms are driven together in denser unions and recoil but slightly, heavy bodies—e. g. iron, stone—are formed (100-105).
- (5) Other atoms recoil widely after collision: now thin, light bodies—e. g. air, sun—are formed (106-108).
- (6) Hosts of atoms are straying about, free, because they have never been admitted to unions and so have never had a part in making bodies (109-111). Witness the motes flying about in the sunbeams that light the dark places of a <closed> house: they are constantly colliding, constantly recoiling (112-120), a fine picture of the ceaseless movement downward of the atoms and of the collisions of the atoms in the great void (121-131).
- (7) Summing up and restatement, here especially elaborate (132-141): All this motion proceeds ultimately from the motion of the atoms (132). The motion of the atoms is self-impelled (133). This motion they impart, through collisions, to bodies slightly larger than the atoms themselves, bodies made up of a few atoms (134-136), then through these bodies to other bodies larger again (137), and so on, till at last we become conscious of the movement when we see it, e. g. in the motes that move in the sunbeams (138-141).

(e) The speed of the atoms (142-164).

This passage and the next, (f), break the thread of the main discussion. That discussion is resumed at 184.

- (1) Preliminary statement: I will now discuss the speed of the atoms (142-143).
- (2) Proof (144-164):
Swift indeed are the sunlight <and the sun's heat: compare 150> (144-149), though they pass not through void but through a body (the air), and, again, their particles do not move one by one, but in groups, so that they are subject to retardation, (1) from themselves, (2) from without themselves (150-156). Swifter far, surely, is the movement of the atoms, since (1) they are solid (single), (2) they move through void (157-164).

(f) A tangential passage, a wide departure from the straight path of the discussion, a footnote (165-183). See above, under (e). Verse 183 shows that Lucretius was conscious that he had digressed.

Some persons, who know nothing about the atoms, fancy that the world was created by the gods: they think of the world as perfectly adapted to the needs of men and so explainable only as product of divine inter-

vention! (165-174). An absurd idea! (174-176). For, even supposing that I knew nothing about the atoms, the very imperfection of the universe proves to me that the universe was *not* created by the gods (177-181). More of this later (182). For the present I will talk about the movement of the atoms (183).

- (g) Discussion of the motion of the atoms renewed (184-332). We go back now to the point reached at 141.

(1) Initial Statement: *Upward* motion of atoms *per se* is impossible; nothing has inherent in it power to move upward (184-186), not even fire (187).

(2) Proofs (188-215):

(1') The upward movement of the fruits and the trees is only an apparent exception to my statement, for, since they have weight, they are really trying with might and main to follow their natural tendency—i. e. to move downward (188-190).

Lucretius does not say, explicitly, what he says under 2', that the upward movement is due to external pressure that overpowers the natural downward tendency.

(2') The upward movement of fire is not inherent in fire, but is the result of external pressure (191-193).

(3') So too is the upward spurting of blood (194-195).

(4') So too is the rising of a log out of water: here, indeed, our eyes help us to discern the truth (196-200).

(5') Summary: All these things, left to themselves, naturally move downward (201-202).

This is a pivotal passage: it sums up 188-200, and prepares the way for 203-215.

- (3) Restatement and expansion <of 187, 191-193> (203-215). So too it is only under pressure from without that fire moves upward (203-205), or across the sky at night, this way and that (206-208). Why, stars fall to the ground! (209). The sun, too, sends his heat (i. e. fire) in *every* direction (210-212). The lightning flies athwart rain and through the clouds (213-214), aye even to the ground (215). In a word, fire flies not merely upward, but in every direction, even downward <always under pressure of some special force>.
- (h) The atoms have power to 'swerve' (216-293).
- (1) Statement (216-220): The atoms have power to swerve from the straight downward motion (their natural, inherent motion), just a trifle, just enough to justify the statement that they change their direction.
- (2) Proofs (221-293).

(1') If they did not swerve, the collisions of the atoms, which alone produce objects, would be impossible: in that event, nothing would ever have been created (221-

224), for we cannot explain the collisions by supposing that, as the atoms fall, the heavier atoms overtake and strike the lighter: in void (i. e. in a vacuum) all the atoms, whatever their weight, move at the same speed (225-242). The atoms, then, 'swerve', but only the least possible bit, not enough to force one to say that their movement is sideways (243-250).

(2') The freedom of the will is proof of the 'swerve' (251-293).

(a) The doctrine of the 'swerve' alone refutes the Stoic conception of fate and alone accounts for the manifest fact that the will of men and animals is free (251-262).

(β) That the will *is* free is shown by what happens when the starting-signal in the chariot-race has been given: only when the will has set in motion the proper atoms can the race horses start (263-271).

(γ) That the will *is* free is proved again by our power to check ourselves when some sudden force has set us moving (272-280), and by our power to change the direction of our motion, even to the extent of reversing that direction (281-283).

(δ) Summing up and (re)statement, applicable really to everything since 61: There are three sorts of motion of the atoms: (1) the normal, i. e. downward, due to their weight; (2) the 'swerve'; (3) the 'blows', the collisions, the result of the 'swerve' (284-293)²⁷.

(i) The motion of the atoms is unchangeable (294-332).

(1) First Statement: The atoms were never more closely compacted (294) nor less closely compacted than they are to-day (295), for the sum total of matter is constant, neither increasing nor diminishing (296)²⁸.

(2¹) Inference from the First Statement: The movements²⁹ of the atoms (i. e. their creative processes) are the same to-day and always will be the same as they were in the past (297-299);

the atoms will always bring objects into being and to maturity exactly as they have in the past, subject to the laws of nature (300-302).

(3) Second Statement: The sum total of matter is constant (303: compare 296).

(4) Proofs of the Second Statement (304-307)³⁰.

(1') There is no place *extra omne* to which anything can withdraw *ex omni*: hence the *omne* cannot lose any part of itself: it can not be diminished (304-305: compare 296).

(2') There is no place *extra omne* from which anything can force its way *in omne*: hence the *omne* cannot gain anything: it cannot be enlarged (306-307: compare 296)³¹.

(j) Another example of *occupatio* (see Note 14).

Explanation of the apparent (seeming) motionlessness of the universe, the *summa copia primordiorum* (308-332).

(1) Preliminary Statement: It is not strange that, though every atom is ceaselessly in motion, the universe as a whole seems stationary, completely at rest (308-311).

(2) Proofs (312-332):

(1') The atoms lie far beneath (beyond) our ken (312-313); hence their movements are even more inevitably beyond our vision, beyond our power of discernment (313-314).

(2') Even things which are within the power of our eyes to descry seem often, when viewed from a distance, to be stationary, though we know that they are in fact in violent motion—e. g. lambs moving swiftly in play, or martial hosts in warlike manoeuvres (315-332).

The point of the two illustrations which make the second proof (317-322, 323-332) is the same. In each case there are, we know, individual objects in violent motion; yet we fancy we see one mass, inert, stationary.

C. K.

(To be continued)

REVIEW

A Latin Reader for the Second Year. By John C. Rolfe and Walter Dennison. Allyn and Bacon (1918). Pp. lii + 644 + 169.

Time was when this book in all probability would have been entitled A Complete Latin Reader, for it certainly provides abundant material for every imaginable requisite of the Second Year. The reading matter includes selections from simplified Roman History, Viri Romae, Nepos, The Argonauts, Caesar's Gallic and Civil Wars, and Aesop's Fables—a total of 218 pages, more than twice as much as the minimum College entrance requirement. The text is fully annotated. The Introduction contains a brief account of the life and

²⁷Since Lucretius is definitely ascribing the freedom of the will to the 'swerve', and since, as he clearly says elsewhere, the collisions are due to the 'swerve', the words *plagas at* are wholly illogical in 285. To the movement of the atoms only two factors contribute: (1) their downward movement, due to their *pondera*, (2) the 'swerve'. From 225-250 it is clear that through their downward motion *per se* the atoms would accomplish nothing: no *res genitae* could come from *that* motion. The 'swerve' accounts at once for the *res genitae* (i. e. the creation and the recreation of the world) and for the freedom of the will.

²⁸*nam* in 296 for a time troubled me; it seemed illogical and incorrect, since, I thought, this verse is logically part of Lucretius's dictum, and not in any way proof (or even illustration) of 293-294. The thought of 296, I felt, is brought in more logically at 303: proof of its truth is there adduced (304-307). But, later, I saw that *nam* is correct, since 296 *does* explain 294-295. The connection of ideas is this. If the total number of the atoms had ever increased, then the *copia materiai* might well have been *magis stipata* (294); had the total number of the atoms ever become smaller, then the *copia materiai* might well have been *maioribus intervallis*. See also Note 29.

²⁹Had the *copia materiai* become *magis stipata*, the movements of the atoms might (would) have become slower; had the *copia materiai* become *maioribus intervallis*, the movements of the atoms might (would) have become swifter.

³⁰See Note 28. What was, in 296, proof of 294-295 is now elevated to the dignity of an independent statement, for which proof is supplied.

³¹The vital part of 293-307, as most germane to the theme of Book 2, is that which has to do with the motion of the atoms. Mark the concluding words of the paragraph.